DOCUMENT RESUME

ED 386 020 FL 023 056

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TITLE Accuracy Order and Frequency Order of Relative Clauses as Used by Japanese Senior High School Students of EFL.
PUB DATE 93
NOTE 29p.
PUB TYPE Journal Articles (080)
JOURNAL CIT Institute for Research in Language Teaching Bulletin; v7 p27-53 1993

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Classroom Research; *English (Second Language); Foreign Countries; *Grammar; Grammatical Acceptability; High Schools; High School Students; *Language Patterns; *Language Proficiency; Language Research; Language Tests; *Linguistic Theory; Second Language Learning; Sentence Structure; Testing; Translation
IDENTIFIERS *Japanese People; *Relative Clauses

ABSTRACT

This study investigated the accuracy order of English relative clauses in the usage of 199 Japanese high school students of English as a foreign language (EFL). Specifically, it looked at: (1) whether the Accessibility Hierarchy conform to the accuracy order by Japanese senior high school students of EFL; and (2) how frequently this population uses relative clauses. Subjects were given three kinds of tests, in grammaticality judgment, sentence-combining, and translation. Results indicate that this population followed an order matching the Accessibility Hierarchy, and the Perceptual Difficulty Hypothesis to some extent, and that the subjects preferred using relative clauses to present participles and post-modification positions. A pedagogical implication is that center-embedding of a relative clause functioning as object of preposition should be an area of classroom instructional focus. (Author/MSE)

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ED 386 020

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The IRLT Bulletin, Vol.7
紀要第7号抜刷

1993
(Oct 1)

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Accuracy Order and Frequency Order of Relative Clauses as Used by Japanese Senior High School Students of EFL*

Mikio KUBOTA

ABSTRACT

This study attempted to investigate whether the accuracy order of English relative clauses would match Keenan and Comrie's Accessibility Hypothesis, and whether relative clauses would be used more frequently than participles and infinitives in postmodification positions. A total of 199 Japanese senior high school students of EFL (English as a Foreign Language) participated in this experiment. Three kinds of tests: grammaticality judgment test, sentence-combining test, and translation test were given to them.

The following results were obtained from the study:

(1) The OS (Object-Subject) type was the easiest to relativize among the SS, SO, OS, OO types.

(2) The accuracy order of relativization was SS, SO, OS>OO in the grammaticality judgment test. In the free composition test, the frequency order was OS>OO>SS>SO. This frequency order matched the pattern of Kuno's Perceptual Difficulty Hypothesis in that right-embedding of relative clauses was preferred over center-embedding.

(3) The subjects followed the pattern that was in accord with the Accessibility Hierarchy, except for the genitive type, only in the grammaticality judgment test: Subject, Genitive>Object>Object of Preposition.

(4) The relative adverb was easier than the relative pronoun functioning

as the Object of Preposition in the grammaticality judgment test.

(5) The 'relative pronoun + deferred preposition' construction was used more frequently than the 'preposition + relative pronoun' construction.

(6) The frequency of using relative clauses was higher than that of present participles and infinitives.

INTRODUCTION

English relative clauses seem to be difficult for Japanese learners to acquire, because the Japanese language has prenominal relative clauses. English is a right-branching language, while Japanese is a left-branching one. Japanese-speaking learners of English have to "switch relative clauses to a postnominal position in the process of learning English" (Schachter 1974:210) and the choice of relative pronoun is dependent on the gender type of antecedent and the case of relative pronoun, and a relative clause is embedded as a modifier in a noun phrase (NP). This syntactic complexity may lead to the late development of relative clause formation in second language acquisition (e.g., Schumann 1980) as well as in first language acquisition (e.g., Menyuk 1969).

The longitudinal study by Schumann (1980) focused on the acquisition of relative clauses by five Spanish-speaking learners of English. He found that relative clauses modifying the object of the main sentence were acquired first and that relative clauses modifying the subject of the main sentence were developed at a later stage. Concerning the order of development of relative pronouns, Schumann (1980) suggested the following three stages of developmental sequences, based on his evidence:

Stage 1 : omission of relative pronoun
'I got a friend speaks Spanish.'

Stage 2 : substitution of personal pronoun for relative pronoun
'I got a friend he speaks Spanish.'

Stage 3 : proper use
'I got a friend who speaks Spanish.'

Following Schachter's (1974) claim that interference between two languages is not the main source of errors, Keenan and Comrie (1977) looked at the similarities among more than fifty languages regarding syntactic functions for relative pronouns and proposed the Noun Phrase Accessibility Hierarchy Hypothesis for relative clauses. This Accessibility Hypothesis represents typological universals of relative clause formation as well as the difficulty order of relative clauses. They provided the following universal hierarchy:

Subject > Direct Object > Indirect Object > Object of Preposition > Genitive > Object of Comparison [> : more accessible than]

A relative clause formation is more natural, that is, more accessible in Subject position than in Direct Object position, which is more accessible than in Indirect Object position, which is more accessible than in Object of Preposition position, and so on.

Gass (1979) looked at the data of relative clauses produced by adult L2 learners of English in the sentence-combining task, and found a close relation between the accuracy order and the Accessibility Hierarchy, except for the position of the genitive (possessive), which proved to be easier than predicted. She explains that the reason for this phenomenon is that 'whose' is the most salient relative marker and that 'whose + noun' is treated as a unit.

Sheldon (1974) examined the difficulty order in the comprehension of relative clauses by children learning English as their first language. Sheldon categorized relative clauses into the following four types for the purpose of her study, based on the functions of the head noun and the relative pronoun:

SS (Subject of sentence is Subject of relative clause)
The people who live in Philadelphia are busy.
SO (Subject of sentence is Object of relative clause)
The people who we know live in Philadelphia.
OS (Object of sentence is Subject of relative clause)
I know some people who live in Philadelphia.
OO (Object of sentence is Object of relative clause)
I know the people who you know.

(examples from Doughty 1991:436)

Sheldon found that children understood sentences in which the function of the head noun was the same as that of the relative pronoun (e.g., SS and OO), formulating the Parallel Function Hypothesis. Thus, she proposes that relative clauses with a parallel function (SS/OO) are easier to acquire than those with a non-parallel function (SO/OS).

Kuno (1974) proposed the Perceptual Difficulty Hypothesis, which predicts difficulty in terms of embedding of the relative clause. Its claim is that center-embedding is perceptually the most difficult kind of embedding, compared with left- and right-embedding, since center-embedding interrupts the processing of the matrix clause: therefore, SS and SO types are more difficult than OS and OO. The Perceptual Difficulty Hypothesis is in line with Slobin's (1973) Universal Operating Principles, one of which claims that "interruption" or "rearrangement" renders sentence processing difficult.

A few empirical studies have been conducted in Japanese EFL situations. Saito (1984) made a survey of natural order of acquisition by Japanese senior high school students. The results supported the Accessibility Hierarchy Hypothesis. Takazawa (1987) studied what she called the 'learnability order'[1] of relative clauses by senior high school and college students (the total number: 226), assessing the paraphrase test in which two sentences were transformed to one sentence with a relative

clause. Her finding is that the OS and SS types were learned more easily than OO and SO, indicating that a relative pronoun which functions as a subject in its relative clause is easier to learn than one functioning as an object and that the antecedent functioning as an object in the main sentence is more accessible than one functioning as a subject.

Kawauchi (1988) gave thirty-four college students the sentence-combining, translation, and free composition tests, resulting in the accuracy order of OS>OO, SS>SO in the sentence-combining test, OO>SO, OS>SO/SS in the translation test. In the free composition test the frequency order was OS>OO>SO>SS. Therefore she concluded that the OS type was the easiest to relativize and the SO type was the most difficult. The results of Kawauchi's study correspond to the Perceptual Difficulty Hypothesis. The following Table 1 is a summary of the past studies of the acquisition order:

TABLE 1: The acquisition order of relative clauses

[Hypotheses]	Acquired FIRST		Acquired LATER
Sheldon (1974)	SS & OO	>	SO & OS
Kuno (1974)	OS & OO	>	SS & SO
Keenan and Comrie (1977)	SS & OS	>	SO & OO
[Empirical studies conducted in Japan]			
Saito (1984)	OS & SS	>	OO & SO
Takazawa (1987)	OS & SS	>	OO & SO
Kawauchi (1988)	OS & OO	>	SS & SO

The results of these three EFL studies in Japan imply that the OS type is the easiest for Japanese learners of EFL to acquire and the SO type is the hardest. There were only three studies regarding the acquisition order of relative clauses in Japanese EFL situations, to the best of my knowledge. In this research, I will investigate how Japanese senior high school students acquire English relative clauses.

It should be noted that strictly speaking, accuracy/difficulty order is distinct from acquisition order; in cross-sectional studies the subjects' abilities to use the language accurately in obligatory contexts are measured at a given point in time, while longitudinal studies attempt to look at the process of how learners develop the language over a long period of time (see Ellis 1985:204, Larsen-Freeman and Long 1991:108). Since this research is a cross-sectional study, the accuracy order is focused on.

Moreover, in the light of work on avoidance, Schachter (1974) examined English compositions written by nonnative-speaking learners, who included Japanese speakers. She found that Japanese students produced fewer relative clauses than Arabic and Persian learners. She established the concept of "avoidance strategy," which she believed Japanese students used. This research will also examine whether or not Japanese senior high school students produce relative clauses frequently.

RESEARCH QUESTIONS

The first purpose of the present study is to examine whether the accuracy order of relative clauses is the same as that of the Accessibility Hierarchy; the second purpose is to explore the frequency of relative clause formation. The following Research Questions are proposed:

(1) Does the Accessibility Hierarchy conform to the accuracy order by Japanese senior high school students of EFL?

(2) Do Japanese senior high school students of EFL use relative clauses frequently?

HYPOTHESES

Hypotheses 1 to 6 concern Research Question No.1, whereas Hypotheses 7 and 8 are related to Research Question No.2.

H1 : The OS type is the easiest for Japanese senior high school students to relativize among the four types.

H2 : The SO type is the most difficult for Japanese senior high school

students to relativize among the four types.

These two hypotheses are in accordance with the Accessibility Hypothesis. Based on Saito (1984), Takazawa (1987), and Kawauchi (1988), it is assumed that Japanese students have the least difficulty in relativizing the OS type, among SS, SO, OS, and OO types. This order of difficulty is also sustained by the Perceptual Difficulty Hypothesis; center-embedding of the relative clause would be more difficult to process than non-center-embedding.

H3 : The Subject type of relative clause is easier to acquire than the Object type.

H4 : The Object type is easier to acquire than the Object of Preposition type.

H5 : The Object of Preposition type is easier to acquire than the Genitive type.

Hypotheses 3 to 5 predict that the Accessibility Hypothesis is a reasonable predictor of difficulty of relativization. The Accessibility Hypothesis represents the following ordering of difficulty:

Subject > Object > Object of Preposition >
Genitive > Object of Comparison

It is hypothesized that correct responses would decrease as the position of the hierarchy goes down. That is, the more accessible position would be produced with greater accuracy than the less accessible one.

Sheldon (1974) proposes the Word Order Hypothesis, which claims that "a surface structure in which the underlying word order is preserved is easier to process than one in which the underlying word order is not preserved." Therefore, relative clauses in which the subject NP is relativized would be easier than relative clauses in which the object NP is relativized. Hypothesis 3 follows Sheldon's prediction.

H6 : There is no statistically significant difference in difficulty of relativization between the Object of Preposition type and the relative

adverb.

No studies or theories have predicted the difference in relativization between a relative pronoun functioning as the Object of Preposition and a relative adverb. Thus, the null hypothesis is proposed.

H7 : Relative clauses are used more frequently than participles in post-modification positions.

H8 : Relative clauses are used more frequently than infinitives in post-modification positions.

Mori (1983) studied the production strategy of postmodification in a composition test given to 70 Japanese university students. Her result showed that 62.5% of the subjects used relative clauses over present participles and more than 90% were favored over past participles. The percentages of using relative clauses were 65.2%, 89.6% over infinitives. Therefore, she concluded that Japanese students tended to use relative clauses more often than participles and infinitives. This study leads to the formulations of Hypotheses 7 and 8.

PROCEDURES

Subjects

A total of 199 Japanese senior high school sophomores of EFL (16 to 17 year olds) were the subjects of this experiment. They had already studied basic usage of relative pronouns such as *who*, *which*, *that*, *whom*, *whose* and relative adverbs, e.g., *when*, *where*, *why*, *how* in class. A relative pronoun functioning as the Object of Comparative was not found in their textbooks, so that it was not examined in this study.

Data collection and analysis

The three kinds of tests were given independently to all the subjects in order to avoid the influence of the previous test and to determine whether or not test variation may result in different performance (see Appendix).

The grammaticality judgment test was intended to get data of receptive knowledge of relative clauses. The sentence-combining and translation tests would reflect productive knowledge. Furthermore, after the three tests were scored, there was another kind of production test given to approximately one-third (n=65) of the sample: free composition test, which was designed to elicit information regarding the subjects' productive knowledge. The test items focused only on restrictive relative clauses.

[TEST I] translation test (10 minutes)

The translation test for Research Question No.2 was given first, since the sentence-combining test and grammaticality judgment test might have hinted at the answer of the translation test. The aim of this test was to check whether the subjects would use relative clauses or other constructions (e.g., participle, infinitive). The subjects were asked to translate 6 Japanese sentences into English.

[TEST II] sentence-combining test (30 minutes)

In this forced production test, the subjects were requested to embed one sentence into another to make a relative clause. There were 20 test items, which required the subjects to produce only one correct sentence in each test item.

[TEST III] grammaticality judgment test (5 minutes)

The subjects were asked to give a grammaticality judgment of 10 sentences, of which 4 sentences were grammatically correct and 6 were incorrect, and to correct the errors if any. For the purpose of this study, ungrammatical sentences included only one error type: relative clause marker selection. The other error types, such as relative marker omission and relative pronoun retention, were excluded.

The scoring criteria used did not count misspellings and mechanical errors in tense, aspect, or number. Categorizing the errors produced is not within the scope of the study. In this research, the significance level of a statistical analysis was set at $\alpha < .05$.

RESULTS

H1 : The OS type is the easiest for Japanese senior high school students to relativize among the four types.

In the sentence-combining test, two items were assigned to each type, while every grammaticality judgment test item included one type, thus the following numbers in the sentence-combining test were the average of the two items. The results were illustrated in Table 2:

TABLE 2: Number of correct answers to 4 types (n=199)

	SS	SO	OS	OO
Sentence-combining test	152 (76.4%)	150.5 (75.7%)	182 (91.5%)	167.5 (84.2%)
Grammaticality judgment test	188 (94.5%)	172 (86.4%)	188 (94.5%)	130 (65.3%)

The x^2 test was employed in order to investigate the differences among the four types in each test. The results show that there was no statistically significant difference in the sentence-combining test ($x^2 = 4.43$, df = 3, $p > .05$(ns); $x^2_{(critical)} = 7.81473$) and that there was a significant difference in the grammaticality judgment test ($x^2 = 13.29$, df = 3, $p < .005$). No statistically significant difference lay anywhere between any pairs in the sentence-combining test, but the data shows that 182 students (91.5%) out of 199 answered correctly to the OS type, which was top-ranked. Furthermore, in the grammaticality judgment test, no sig-

to the Object type. A statistically significant difference was found between the Subject type and the Object of Preposition type ($\chi^2 = 6.86$, $df = 1$, $p < .05$).

Therefore, the results display that Hypothesis 2 is supported in the grammaticality judgment test, but not in the sentence-combining test.

TABLE 3 Number of correct answers for Relative Clause types ($n = 199$)

	Subject	*Object*	*Object of Preposition*	*Genitive*
Sentence combining test	167 (83.9%)	159 (79.9%)	157.5 (79.2%)	130.5 (65.4%)
Grammaticality judgment test	198 (99.5%)	151 (75.9%)	106 (53.3%)	199.5 (91.8%)

H4 : The Object type is easier to acquire than the Object of Preposition type.

Table 3 shows that the number of correct answers to the Object type ($n = 159$, 79.9%) was about the same as that of correct answers to the Object of Preposition type ($n = 157.5$, 79.2%) in the sentence-combining test. No significant difference was found between them ($\chi^2 = 0.006$, $df = 1$, $p > .05$(ns)). In the grammaticality judgment test, 151 subjects (75.9%) made correct judgments of the Object type, while only 106 students (53.3%) responded correctly to the Object of Preposition type. The difference reached statistical significance ($\chi^2 = 28.86$, $df = 1$, $p < .005$). Consequently, this hypothesis was supported only in the grammaticality judgment test.

H5 : The Object of Preposition type is easier to acquire than the Genitive type.

In the sentence-combining test, the ratio of correct answers was 79.2% ($n = 157.5$) in the Object of Preposition type and 78.2% ($n = 158.5$) in the Genitive type. There was no significant difference in the sentence-combining test ($\chi^2 = .2$, $df = 1$, $p > .65$ (ns)). On the contrary, a significant difference was found in the grammaticality judgment test between the Object of Preposition type ($n = 106.5$, 53.3%) and the Genitive type ($n = 168.5$, 84.8%) ($\chi^2 = 23.15$, $df = 1$, $p < .001$). However, the number of correct answers in the Genitive type was larger than that in the Object of Preposition. This reveals that Hypothesis 5 is not confirmed in the sentence-combining test and the grammaticality judgment test.

H6 : There is no statistically significant difference in difficulty of relativization between the Object of Preposition type and the relative adverb.

In the sentence-combining test, the ratio of correct answers to the Object of Preposition type (79.2%, $n = 157.5$) was approximately the same as that to the relative adverb (81.7%, $n = 162.5$); the difference failed to achieve statistical significance ($\chi^2 = 0.98$, $df = 1$, $p > .05$ (ns)). In the grammaticality judgment test, only 106 students (53.3%) responded correctly to the Object of Preposition type, but 173.5 students (87.2%) made correct answers to the relative adverb; there was a significant difference between them ($\chi^2 = 36.2$, $df = 1$, $p < .001$). Thus, this hypothesis proves to be correct in the sentence-combining test, but not in the grammaticality judgment test.

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TABLE 4 Number of correct answers (n = 199)

	Number of Responses	Relative adverb
[illegible]	[illegible]	162.5
	[illegible]	(81.7%)
[illegible]	[illegible]	173.5
	[illegible]	(87.2%)

H7 : Relative clauses are used more frequently than participles in post-modification positions.

132 students (72.5%) out of 182 students who wrote grammatical sentences used relative clauses, whereas only 50 students (27.5%) used present participles in Question No.1. In Question No.3 the ratio of using relative clauses was 81.4% (n = 153 of 188), but the ratio of using participles was only 18.6% (n = 35). Hence, on average, 75% (n = 142.5) of students used relative clauses, while 25% (n = 47.5) used present participles. There was a statistically significant difference between relative clauses and present participles ($x^2 = 47.5$, df = 1, $p < .001$).

The percentages of using relative clauses were 45.3% (n = 82 out of 181) in Question No.2 and 63.1% (n = 113 of 179) in Question No.4. The percentages of using past participles were 54.7% (n = 99) in Question No.2 and 36.9% (n = 66) in Question No.4. The average number of using relative clauses was 98.5 (n = 95.5) and the average of participles was [illegible] (n = 82.5). No statistically significant difference was found ($x^2 =$ [illegible], df = 1, $p >$ [illegible]).

The hypothesis is supported in the comparison of relative clauses and present participles in that relative clauses were used more frequently than present participles. However, the hypothesis is not supported in the comparison of relative clauses and past participles.

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TABLE 5: Frequency of relative clause and participle (n=199)

	Question No. 1	Question No. 5	Question No. 2	Question No. 4
Relative clause	132 (72.5%)	153 (81.4%)	82 (45.3%)	113 (63.1%)
Participle [present/past]	60 (27.5%) [present]	35 (18.6%) [present]	99 (54.7%) [past]	66 (36.9%) [past]

H8 : Relative clauses are used more frequently than infinitives in post-modification positions.

A total of 157 (91.3%) out of 172 students preferred relative clauses to infinitives, which 15 students (8.7%) used, in Question No.3. In Question No.6, the percentage of relative clauses was 54.3% (n=94 of 173) and that of infinitives was 45.7% (n=79). On average, 125.5 students (72.8%) favored relative clauses more than infinitives, which 47 students (27.2%) used ($x^2=35.72$, df=1, $p<.001$). Therefore, Hypothesis 8 is supported in that relative clauses were favored more than infinitives in postmodification positions.

TABLE 6: Frequency of relative clause and infinitive (n=199)

	Question No. 3	No. 6
Relative clause	157 (91.3%)	94 (54.3%)
Infinitive	15 (8.7%)	79 (45.7%)

DISCUSSION

Research Question No.1 sought to probe empirical validity for the Accessibility Hierarchy Hypothesis. The following three interesting findings are evident in this research question:

(1) The OS type was the easiest to relativize (Hypothesis 1). This ordering conformed to both the Accessibility Hypothesis and the Perceptual Difficulty Hypothesis. The result seems to suggest that a non-center-embedded relative clause does not interrupt the processing of the matrix sentence, which is easily processed without interruption thanks to the human processing mechanism. The result also supports the research of Ioup and Kruse (1977), in which relative clauses with only one level of center-embedding caused difficulty in grammaticality judgment tests by L2 learners. Consequently, it is concluded that embedding of a relative clause may be a plausible determiner of difficulty order. In addition, the easiest rank (OS type) is in line with the difficulty order predicted in the Accessibility Hierarchy (SS, OS>SO, OO), but does not correlate with the order predicted in the Parallel Function Hypothesis.

Surprisingly enough, the data shows that the SO type was not the most difficult type to relativize, which runs contrary to Hypothesis 2. However, the SO type appears to be the most difficult in the sentence-combining test: there is a slight tendency toward this direction ($p < .1$). The overall order of difficulty of relativization was not established in the sentence-combining test, however in the grammaticality judgment test the order was SS, SO, OS>OO. Two analyses for this phenomenon are taken into consideration. One analysis may be the limitation of test measures: there was only one kind of test for measuring the learners' receptive knowledge, namely the grammaticality judgment test and only one forced production test: the sentence-combining test. It was found that different tests produced qualitatively different results, as Gass (1979:333) pointed out. It is possible to assume that the learners' receptive knowledge is stable, while the results of the production test may be influenced

TABLE 7: Frequency of relative clause in the composition test

	SS	SO	OS	OO
Composition test	16 (22.2%)	5 (6.9%)	31 (43.1%)	20 (27.8%)

($x^2 = 19.22$, df = 3, $p < .001$)

by the variability of the learners' proficiency. The other analysis may be that the subjects already gained high competence of relative clause formation: all the percentages of correct answers in the four types were over 75% in the sentence-combining test, and more than 86% in the grammaticality judgment test except the OO type (see Table 2).

An additional production test was given in order to check the validity of the results by the other measure on the same subjects. A total of 65 subjects out of 199 were requested to write a composition entitled "The 21st century" in 30 minutes. As displayed in Table 7, the test results[2] show that the frequency order in the composition test was OS > OO > SS > SO, and matched the result of Hypothesis 1 and the pattern of the Perceptual Difficulty Hypothesis. This finding is not consistent with Kellerman's (1984:111) conclusion that the Accessibility Hypothesis seems to be a good predictor of frequency of relative pronoun functions in free composition. The data indicates that right-embedding (OS, OO: n = 51, 70.9%) is preferred over center-embedding (SS, SO: n = 21, 29.1%). As mentioned earlier, it may be plausible to mention that the subjects found center-embedding difficult, so that they tended to avoid it. (2) The subjects followed the pattern that matched the Word Order Hypothesis and the Accessibility Hierarchy, except for the Genitive type, only in the grammaticality judgment test (Hypotheses 3 to 5). It was found that there was no significant difference between the Subject type (n = 188) and the Genitive type (n = 188.5) ($x^2 = 0.0003$, df = 1, $p > .05$(ns)). The results in the grammaticality judgment test reveal that

the Subject and Genitive types were easier to relativize than the Object type, which was easier than the Object of Preposition type (see Table 3). Hence, the overall ranking of order in this research is expressed as follows:

Subject, Genitive > Object > Object of Preposition

($\chi^2 = 28.93$, df = 3, $p < .001$)

It was found that the subjects responded more correctly to the relative pronoun indicating a genitive (possessive) relationship than the ordering proposed by the Accessibility Hypothesis, in the grammaticality judgment test. This result is the same as the finding of Gass (1979). Gass (1979:341) states that this type has the only relative marker that is uniquely coded for case/grammatical relation in English, making 'whose' the most salient marker, and that 'whose + noun' is treated as a unit. These views may explain the high percentage (94.8%) of correct judgments. On the contrary, to produce the Genitive type was the most difficult (65.5%) among the four relative clause types (see Table 3), the result of which reveals that the productive knowledge differs from the receptive knowledge. The order predicted in the Accessibility Hierarchy was not observed in the sentence-combining test. The reasons for this may be the limitation of only one production test and the high proficiency level of the subjects, as mentioned above.

Pavesi (1986:40) states that the Accessibility Hierarchy can be interpreted as an implicational scale of markedness: the easiest (least marked) position to relativize is the Subject, while the most difficult (most marked) is the Object of Comparative. It is suggested that the markedness principle can influence second language acquisition: the unmarked or the less marked items are learned early and the more marked ones later (Wode 1984). The data of the grammaticality judgment test in this research supports the markedness principle with the exception of the Genitive in that the acquisition of relative pronouns progresses from unmarked to marked functions.

(3) The easier position to relativize was a relative clause containing a relative adverb, with the Object of Preposition type becoming more difficult in the grammaticality judgment test (Hypothesis 6). The difference was statistically significant ($x^2=16.3$, df=1, $p<.001$). This suggests that *when* and *where* as relative adverbs are easier to judge appropriately relating to the antecedent, as compared with a more complex structure containing a relative pronoun with preposition; it seems more demanding for the subjects to check two parts of speech, namely a relative pronoun and a preposition appropriately. For instance, the following Question No. 5 in the grammaticality judgment test was the most difficult to detect the error and correct it if necessary:

[Question No.5] The museum where we went to was very beautiful.

A total of 138 students (69.3%) of 199 made errors in this question. Table 8 shows the result:

TABLE 8: Result of Question No. 5 in the grammaticality judgment test

	judged it correct	chose *that*	chose *who*	chose *whom*	chose *what*	chose *how*	chose *was*
Number of subjects	128	5	1	1	1	1	1

Interviews were given to 25 subjects (from 1 class) who judged the sentence correct. The interviews, conducted in Japanese, included the following question: Why did you think the use of *where* was correct? Table 9 displays the result of the interviews:

TABLE 9: Result of the interviews

Number of answers	Contents of answers
18	The antecedent denotes the place.
5	where is the object of preposition (*to*).
2	I have no idea.

More than two-thirds of the interviewees thought that the antecedent (the museum) denoted the place, so that these subjects did not understand the syntactic function of the relative adverb in its relative clause. It seems that they tended to judge *where* correct when the antecedent denoted the place, irrespective of the preposition.

A post-hoc analysis of the data in the sentence-combining test reveals that the subjects preferred using the 'relative pronoun + deferred preposition' construction, named "preposition stranding" (Hornstein and Weinberg 1981) to the 'preposition + relative pronoun' construction. In all 4 questions, the difference between the numbers of 'preposition + relative pronoun' and 'relative pronoun + deferred preposition' was statistically significant (see the following Table 10). There are two plausible explanations for this. One explanation is that the subjects were very familiar with such set phrases as 'be interested in,' 'talk to,' and 'look for,' so the subjects were not likely to split the phrase and move the preposition. The other explanation is the influence of the testing procedure: the subjects were required to combine the two sentences, one of which included the above-mentioned set phrases. The subjects may have simply deleted the personal/non-personal pronoun without moving the preposition. It seems possible to state that this result is in line with the Word Order Hypothesis proposed by Sheldon (1974) in that the surface structure where the underlying word order is preserved is more easily processed than one in which it is not preserved.

TABLE 10: Number of choices of constructions

	'preposition + relative pronoun'	'relative pronoun + deferred preposition'	
Question No. 9	38 (25.0%)	114 (75.0%)	$x^2=38.00, df=1, p<.001$
Question No. 10	58 (33.7%)	114 (66.3%)	$x^2=18.24, df=1, p<.001$
Question No. 15	14 (11.3%)	110 (88.7%)	$x^2=74.32, df=1, p<.001$
Question No. 16	8 (4.4%)	174 (95.6%)	$x^2=15.14, df=1, p<.001$

Research Question No.2 attempted to examine the frequency of relative clause formation. It was found that relative clauses were used more frequently than present participles in postmodification positions (Hypothesis 7). What is more, the frequency of relative clauses was higher than infinitives in postmodification positions (Hypothesis 8). This indicates that Japanese senior high school students tend to prefer relative clauses to present participles and infinitives. Two analyses may be taken into account, as Mori (1983:127) pointed out. First, a clause is semantically very easy to comprehend and produce, because there exists a subject and a verb in a relative clause. Second, the presence of tense, aspect, and modality plays an important role in processing a relative clause. The validity of either analysis, however, remains to be claimed. The results are clearly incompatible with Schachter's (1974) finding in which the Japanese learners tended to avoid relative clauses in free compositions. No statistically significant difference was found between the frequencies of relative clauses and past participles (Hypothesis 7). This contradicts Mori's (1983) results, which showed that the subjects used relative clauses (90.4%) more often than past participles (9.6%). No claim can be made about the preferences of relative clauses over past participles.

CONCLUSION

The results in this classroom research indicate that the Japanese senior high school students of EFL followed the order that matched the Accessibility Hypothesis and the Perceptual Difficulty Hypothesis to some extent, and that they preferred using relative clauses to present participles and infinitives in postmodification positions. The conclusions are summarized as follows:

(1) The OS type was the easiest to relativize among the four types. Embedding of a relative clause may be a plausible determiner of accuracy order of relative clauses, because the embedded relative clause tends to cause the processing problem. Hence, this finding is in accordance with the Perceptual Difficulty Hypothesis.

(2) The accuracy order of relativization was SS, SO, OS > OO in the grammaticality judgment test. In the free composition test, the frequency order was OS > OO > SS > SO. This ordering matches the above-mentioned conclusion (1) and the pattern of the Perceptual Difficulty Hypothesis. It was found that the right-embedded relative clause was preferred over the center-embedded one.

(3) The subjects followed the pattern that was in accord with the Accessibility Hierarchy, except for the Genitive type, only in the grammaticality judgment test:

Subject, Genitive > Object > Object of Preposition

The exception of the Genitive type may be explained by the idea that the genitive marker is the most salient of the relative clause markers and 'whose + noun' is treated as a unit.

(4) The relative adverb was easier than the relative pronoun functioning as the Object of Preposition in the grammaticality judgment test.

(5) The 'relative pronoun + deferred preposition' construction was used more frequently than the 'preposition + relative pronoun' construction. The reasons for this may be familiarity with set phrases and with the testing procedure.

(6) The frequency of using relative clauses was higher than that of present participles and infinitives.

A pedagogical implication that emerges from this research is that center-embedding of a relative clause and a relative pronoun functioning as Object of Preposition should be an area focused on in the classroom. This does not suggest that the center-embedded relative clause, such as the SS and SO types, be taught after the right-embedded one.

It should be noted that it may be dangerous to reach firm conclusions on the basis of this classroom research, because of the following two limitations. First, the number of subjects (n = 199) was small. Second, there was a problem of test methodology. In Research Question No.1, only one kind of test (grammaticality judgment test) was given to check receptive knowledge and one kind of forced production test (sentence-combining test) was employed, though there was a very small scale of free production test (composition); in Research Question No.2, there was one kind of production test (translation test). Moreover, the number of test items was small in each relative clause type.

Further research should include longitudinal data to investigate the acquisition order in a real sense. A similar research must be conducted to investigate whether or not different tests may trigger different results, using far larger samples. Moreover, the effect of instruction must be examined. Gass (1979, 1982) and Eckman et al. (1988) discovered that the maximal generalization of learning took place from typologically more marked structures to typologically less marked structures, and not the reverse. This 'projection hypothesis' (Zobl 1983) proposes that a learner is credited with a *projection device* that enables the acquisition of one rule to trigger the acquisition of all the other rules that cluster with it (Ellis 1990:159). This area of research will be crucial to investigate the effect of formal instruction.

NOTES

* This research is partly supported by the thirty-first Shimonaka Scholarship in 1992.

1. Takazawa (1987) used the term 'learnability order' (the order of ease to learn) rather than 'acquisition order,' since her subjects did not reach the 'acquisition' criterion (90%), which was based on Dulay and Burt (1975).

2. Relative pronouns functioning as Object of Preposition (n = 3) and Genitive (n = 1), and relative adverbs (n = 4) were excluded in the analysis of the free composition test, because of the small number.

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APPENDIX: English test

(Directions were written in Japanese on test papers.)

TEST I　英語に訳しなさい。
(Put the following into English.)

N. B.　The model answers are written in parentheses below.

1　僕はその店の前を走っている赤ん坊を知っている。
(I know the boy who is running in the park.)
(I know the boy running in the park.)

2　彼は英語で書かれた手紙を受け取った。
(He received the letter which was written in English.)
(He received the letter written in English.)

3　彼はその島を訪れた最初のアメリカ人です。
(He was the first American that visited the island.)
(He was the first American to visit the island.)

4　これがトムによって壊されたドアです。
(This is the door which was broken by Tom.)
(This is the door broken by Tom.)

5　図書館で本を読んでいる男性はトムの父です。
(The man who is reading in the library is Tom's father.)
(The man reading in the library is Tom's father.)

6　僕は尋ねるべき質問がたくさんある。
(I have many questions that I should ask.)
(I have many questions to ask.)

TEST II　関係代名詞または関係副詞を用いて，次の2つの文を1つの文にしなさい。
(Combine the following sentences, using relative pronouns or relative adverbs.)

1　The girl is looking for her boyfriend. She arrived at the airport.
2　The book was very interesting. I read it yesterday.
3　I like the teacher. She gives us easy tests.

2 Mary will buy flowers. She mother loves them.
3 The cat is now sleeping well. It has eaten much food.
4 The man must be Tom. I saw him the other day.
5 Look at these beautiful houses. They stand on the hill.
6 Do you remember that girl? We met her in the park last night.
7 The name of the girl is Kathi. I went to the party with her.
8 I will lend the magazine. You are interested in it.
9 The book was written by Tom. Its cover is blue.
10 I have a girlfriend. Her father is a famous painter.
11 The day was Nov. 11. I went to the concert for the first time then.
12 I remember the town. I lived there ten years ago.
13 The gentleman looked very happy. You talked to him.
14 Did you find the watch? You were looking for it.
15 The girl was shocked. Her bag was stolen.
16 You can see the house. Its roof is blue.
17 The name of the country is China. I spent there for three years.
18 I will not forget the day. I first met her then.

TEST III もし次の下線部に誤りがあれば，訂正しなさい。
(Correct the following underlined word, if it is not used correctly.)

1 The taxi driver which took me to the zoo was very talkative.
2 The letter which I received yesterday had no stamp on it.
3 I know a boy which eats paper.
4 I need to hire the businessman that you recommended.
5 The museum where we went to was very beautiful.
6 The policeman measured the speed at which the car was traveling.
7 The girl which name was called left the room.
8 I know the man who father climbed Mt. Everest.
9 The year when I first went to Hawaii was unforgettable.
10 I found my bag at the place which I had left it.

(鶴舞学園女子短期大学)